News of Science

Insect Hosts of Plant Viruses

Most plant viruses are transmitted from plant to plant by insect vectors. Evidence has been accumulating for some years that in certain cases the insect may be more than a mechanical carrier of the virus; that is, the insect may serve as an alternative host for the virus. Certain plant viruses can be transmitted from one generation of insects to the next by transovarial passage without the need for an intermediate plant host. Others, such as the aster-yellows virus, are acquired naturally by the insect through feeding on a diseased plant. After feeding, the insect vector becomes infective for other plants only after an incubation period of about 10 days, but it then remains infective for the remainder of its life.

The aster-yellows virus can be transmitted in the laboratory from one leafhopper to another by mechanically injecting into normal insects the juice of ground-up virus-infected insects, as was demonstrated originally by L. M. Black in 1940. Later the virus was transmitted from insect to insect in indefinite series by injection while the insects were maintained on plants that did not support growth of the virus [Maramorosch, *Phytopathology* **42**, 59 (1952); for a review of the literature on multiplication of plant viruses in insect vectors see Maramorosch, *Advances in Virus Research* **3**, 221 (1955)]. The presence of virus in the insects is demonstrated by placing them on healthy aster plants and observing the plants for the symptoms of the yellows disease.

Cross-protection tests have long been used to determine whether or not two plant viruses are closely related. For instance, plants that are infected with California aster-yellows are resistant to eastern aster-yellows virus, and vice versa. Since both virus strains may be transmitted by the same species of leafhopper, it was possible to do a cross-protection test in the insect vector as well [Kunkel, *Advances in Virus Research* **3**, 251 (1955)]. Leafhoppers were infected with one of the two viruses by letting them feed on infected plants, and then two weeks later they were exposed to the second virus by the same technique. After a further incubation period, they were tested to see which virus they would transmit to susceptible plants. Invariably the insects were able to transmit only the virus to which they were first exposed. Thus, there is interference between these two virus strains in the insect host as well as in the plant host.

Although the aster-yellows virus multiplies in its insect vector, it causes no obvious disease symptoms, and the infected leafhoppers live as long and breed as freely as noninfected individuals. However, a careful cytological study of the tissues of infected and virus-free leafhoppers [Littau and Maramorosch, *Virology* **2**, 128 (1956)] revealed changes in the cells of the fat-body. In uninfected insects the nuclei of these cells were round, and the cytoplasm was homogeneous and heavily stained with azure B. In infected insects the nuclei of the fat-body cells were mostly star-shaped, and the cytoplasm was reticulate and less intensely stained with azure B. The authors suggest that these cytological changes are evidence of disease and that the aster-yellows virus may multiply in the cells of the fat-body.

Recent developments in tissue-culture techniques have suggested further experiments on the growth of aster-yellows virus in insects. Leafhoppers in the nymph stage were fed for 2 days on plants diseased with aster-yellows virus. If the insects were ground up at this time and the juices were injected into adult insects, no virus could be recovered and demonstrated by the infectivity of the injected insects for aster plants. If the nymphs were permitted to live for 10 days, the incubation period for infectivity of the virus, and then ground up, the virus was readily recovered by injection of the juice into adult insects. Some of the leafhopper nymphs after feeding for 2 days on diseased plants were anesthetized and cut up, and the pieces were incubated in tissue-culture fluid for 10 days. At this time it was possible to recover virus by injecting the juice of the ground-up tissue-culture fragments into adult leafhoppers [Maramorosch, *Virology* **2**, 369 (1956)]. This experiment indicates that the aster-yellows virus can develop infectivity in cultures of insect tissues, as well as in the living insect, and suggests that the culture of individual organs may demonstrate the actual site of virus infection in the leafhopper.—M. H. A.

New Technique for Machining Tungsten

At the North American Philips Laboratories, R. Levi, has developed a technique [*Philips Tech. Rev.* **17**, 97 (1955)] to machine tungsten, which otherwise as a solid is so brittle that any machining is practically impossible.

For this purpose tungsten powder is compressed at about 2000 kg/cm^2, is presintered at 1150°C, and then sintered some more at 2400°C in a water-free reducing atmosphere. The density of the ingots reaches the value of 83 to 84 percent of solid tungsten. This porous material is next infiltrated with a filler that does not alloy with the tungsten itself. Gold, copper, and alloys of the two in all proportions seem to be suitable for these requirements.

The ingot is placed on top of a weighted amount of copper, slightly in excess of the amount that would be necessary to fill all the pores, and is impregnated at a temperature of about 1350°C. Capillary action then fills all the pores, and this is facilitated by a hydrogen atmosphere and its fluxing action. The filler not only fills all the pores but acts as a lubricant during the machining operation.

When the machining is completed, the volatilization of the copper is effected by heating the machine parts in a vacuum furnace to 1800° to 1900°C for a sufficient time. Spectroscopic examination shows only extremely faint traces of copper. Intricate parts of different sizes, including very small ones, can, in this way, be made to close the dimensional tolerances.—K. L. H.

Timber Outlook

The U.S. Department of Agriculture has issued a nontechnical publication entitled *People and Timber*, which is based on the *Timber Resource Review*, a 3-year study made by the USDA's Forest Service with the collaboration of state foresters, state agencies, forest industries, and other private and public organizations.

The annual timber cut is 48.8 billion board feet. By the year 2000, timber needs are expected to rise to 80 to 100 billion board feet a year because of an expanding economy and an increased population. According to the study, these increased needs can be met if all forest land is put under good management. About one-fourth of the forest land in this country is not growing nearly as much timber as would be possible under good management.

Insects, disease, and fire each year kill 13 billion board feet of sawtimber, an amount equal to one-fourth the net sawtimber growth. In addition they weaken big trees, delay natural restocking, and cause other serious losses in growth.

Of the timber cut, 25 percent is not used at all, the Forest Service study showed. Some residue will always be left in the woods and at the mills, but development of new uses for wood residues and improved methods of logging and sawing can reduce such losses.

According to the Forest Service, improved methods of forest management are most needed on the farm and other nonindustrial private timber holdings, most of them less than 100 acres in size.

The progress made in the last decade, the booklet points out, indicates what can be done. The growth of softwoods in the East now exceeds the cut of softwoods. Productivity is relatively good on forest industry and public lands. Gains are being made in forest-fire prevention and control. Wood is holding its own as an industrial material with consumption at an all-time high.

Korean Mineral Assay Laboratory

The Taejon Mineral Assay Laboratory, built and equipped by the United Nations Korean Reconstruction Agency (UNKRA) to help Korea utilize its mining resources to best advantage, has been formally turned over to the Ministry of Commerce and Industry of the Republic of Korea.

Since its official opening in March 1954 the laboratory, under the supervision of UNKRA technicians, has tested and examined Korea's mineral deposits and trained Korean mining graduates in various metallurgical processes. In the past year its capacities were extended to include facilities for mine owners and professors who wished to carry out individual research.

In making the formal transfer at a ceremony held at Taejon, John B. Coulter, agent general of UNKRA, described the activities of the laboratory and said, "Korea has many sources of mineral wealth, the full extent of which has yet to be measured. We know that gold, graphite, tungsten, lead, and copper deposits exist, which may aid in the industrial development of Korea and earn foreign exchange.

"To assist in the exploitation of these resources, the United Nations Korean Reconstruction Agency built this assay laboratory at Taejon and installed the most modern equipment for conducting mineral analyses and metallurgical tests.

"The laboratory has now been operating for over 2 years, often analyzing more than 300 samples a month, to determine the commercial value of existing mines and to evaluate new deposits. It is fully manned with a trained Korean staff, and is already meeting the essential needs in this field. It is the best equipped laboratory of its kind in the Far East."

Acetoglyceride Process Patented

A basic patent on the preparation of the chemically modified fats known as acetoglycerides has just been granted and is now available for licensing without cost. The patent was granted to Reuben O. Feuge, Earl J. Vicknair, and Klare S. Markley, as a result of work done at the Southern Utilization Research Branch of the Agricultural Research Service, U.S. Department of Agriculture. It is U.S. Patent No. 2,745,749, "Glyceridic mixtures exhibiting unique properties and process for their production"; copies may be purchased for 25 cents each from the U.S. Patent Office, Washington, D.C.

Investigations leading to issuance of the patent were concerned with cottonseed, soybean, peanut, and other vegetable oils. It was found that acetylation of monoglyceride mixtures of these oils with fatty acids containing two to four carbon atoms yielded products with a number of unique and desirable properties. Some of these products are flexible, waxlike, and nongreasy in texture and appear to have many possibilities for use in the food industry, such as coatings for meat products, cheese, candies, ice-cream bars, and other foods. Melting points of acetoglycerides can be varied for special requirements, and some of the products hold the desired texture over a relatively wide range of temperatures. Another advantage of the acetoglycerides is their resistance to oxidation, or rancidity. Aside from food and cosmetic uses, they also have possibilities as plasticizers, lubricants, and the like.

Peabody Museum Expedition

The Peabody Museum of Salem, Mass., is the sponsor of an expedition to the South Seas by the yacht *Varua*, captained by William Robinson. Robinson is accompanied by the photographer, Eliot Eliosofohn, and the entomologist, David Bonnet.

During a lengthy cruise among the Pacific islands, the expedition will attempt to trace the origins of the Polynesian people and solve a problem that has interested scientists and laymen alike since the first Pacific explorations of Captain Cook in 1768. Interest on the part of the general public has been stimulated lately by the voyage of Thor Heyerdahl and his assistants on the balsa raft *Kon Tiki* in these waters.

A new approach will be used in an endeavor to determine the possible origin of the Polynesians. Recent findings of entomologists and research workers indicate that a particular type of filaria, apparently confined to people of the Polynesian race, is distributed throughout the archipelago and also extends across the Pacific to the mainland of southeast Asia.

The route that the expedition will follow was planned at the museum by Donald S. Marshall, research anthropologist for Polynesia, and Ernest S. Dodge, director, in consultation with Bonnet. During a 6-months' cruise, stops will be made at each of a series of selected islands, where information about the natives, as well as blood samples for filaria, will be gathered.

Messages by Meteor Trails

A Canadian Defence Research Board team has developed a new communications technique that uses the trails of single meteors to transmit messages over long distances. Called "Janet" on its inception 4 years ago, the project's principles have just been declassified by the Canadian Department of National Defence.

P. A. Forsyth, of the Radio Physics Laboratory at Shirley Bay near Ottawa, first visualized the practical possibilities of using individual meteor trails from the ionosphere as a communications aid. Hundreds of meteors enter the earth's atmosphere every hour. They leave behind, at a height of about 60 miles, trails of charged particles that can reflect radio waves. Forsyth and his associates discovered that these trails can be used for communicating between distant points on the earth's surface. Experiments have proved that the signals can be transmitted by the "Janet" method for distances up to 1000 miles.

Although large meteors occasionally flash through the atmosphere, those used in the "Janet" system are tiny particles about the size of a pinhead, which leave a trail of electrons. The equipment required for the transmission of messages by this new technique is relatively simple. Because the method is reliable and uses low-power equipment, efficient and economical long-range communication systems for all-season use are a possibility.

The system employs frequencies previously used only for short-distance transmission, such as television broadcasts. Because these frequencies are considerably less crowded than those now being